# CARDIACT

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Senior Capstone 2014
Graphic Communication Design

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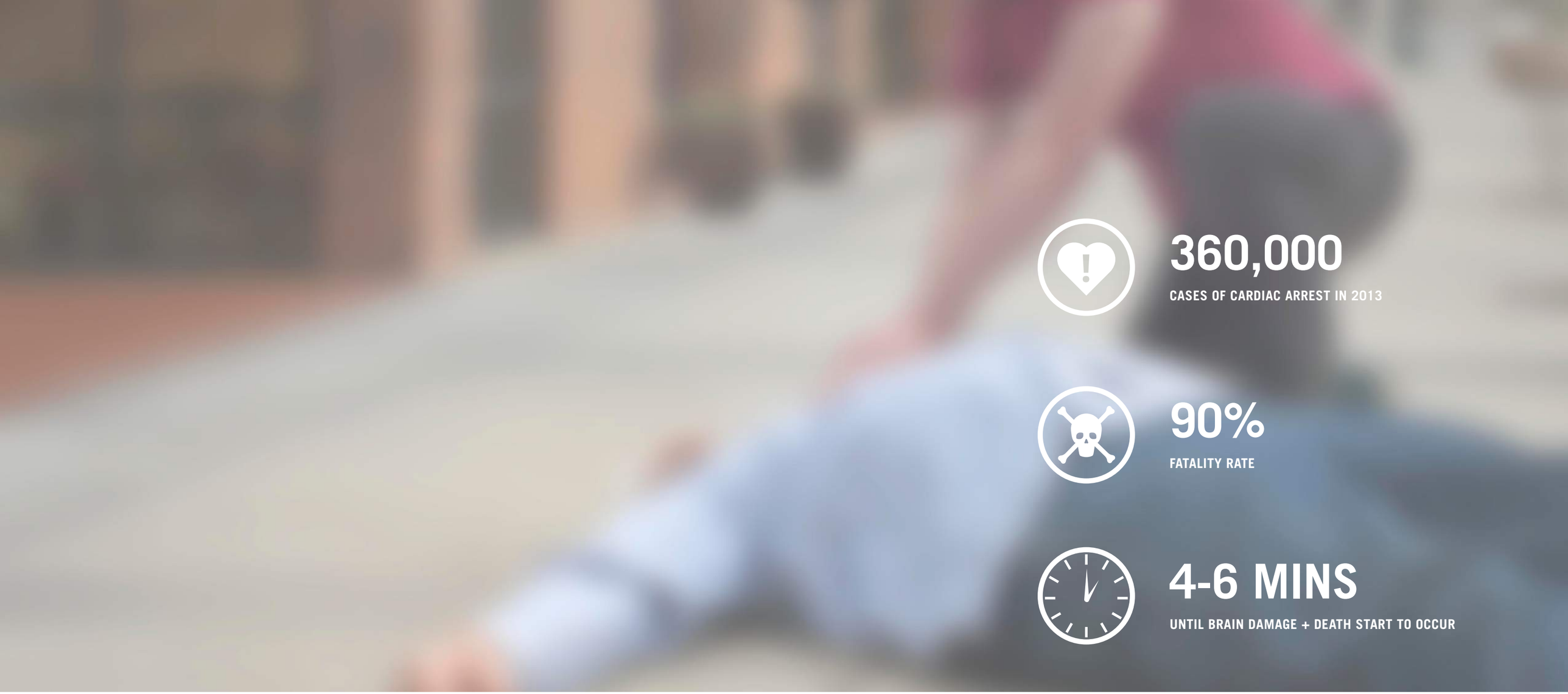
# OVERVIEW

This opening section will provide an introduction to CardiAct by explaining the problem, presenting a project statement, and defining the user groups.




# PROBLEM

Cardiac arrest is a malfunction of the heart's electrical system, causing a sudden cessation of normal heart function. It is consistently one of the leading causes of death in the United States. In 2013 alone, there were nearly 360,000 cases of cardiac arrest that occurred outside of a hospital, and the fatality rate for these cases was over 90%. The sooner a victim of cardiac arrest receives assistance, the better their chances of survival, and because EMS response times can vary based upon availability and location, victims are often dependent on assistance from bystanders to save their lives. It only takes 4-6 minutes after heart function ceases for permanent brain damage and death to occur. 30% of the U.S. population is CPR certified, providing a large base of people who are able to assist victims. Despite this, bystander assistance is only provided in as little as 15% of cases each year.

# PROJECT STATEMENT

Cardiact is a mobile application designed to reduce response time for victims of cardiac arrest by crowdsourcing assistance from CPR certified individuals near a victim during an emergency. Pairing the application with a supported physical heart monitor will allow it to keep track of a user's heart rate, detect any abnormalities, and request help automatically if the victim is unresponsive.

The application will be used by both the potential victims, and the potential responders. When a user is in need of emergency assistance, they can use the app to request help.

When help is requested, an alert is sent out to any CPR certified users within a 2 mile radius of the victim. The app will also notify 911 dispatch, as well as any emergency contacts specified by the victim.

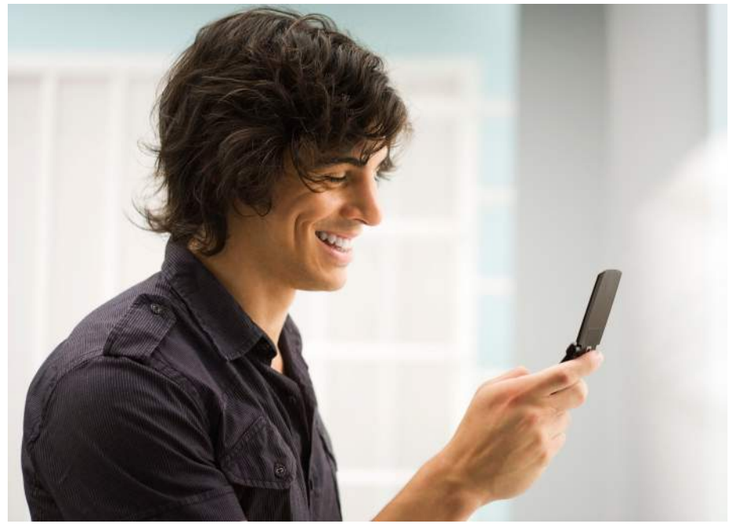
All users who receive this alert will see the necessary information required to respond to the emergency. They can use the app to navigate to the victim, communicate with other responders, and access vital information about the situation.

# USERS

## USER GROUP A

People who are at moderate risk of cardiac arrest due to risk factors like age, obesity, smoking, heart disease, etc. Their risk of cardiac arrest is not severe enough to consider surgery, or wearing a defibrillator full-time, but they would still like to be proactive in the fight against cardiac arrest. These people will typically be older (35+), but they are not technology illiterate. They want something that will provide some insurance in the case of cardiac arrest, but not impede their day-to-day lifestyle and activities with bulky equipment or high-maintenance technology.

## USER GROUP B



People who are willing to provide help in the case that someone experiences cardiac arrest in their immediate proximity. These individuals are CPR-certified, and consider themselves samaritans who would be able to function in an emergency situation. They are mobile, motivated, and technology literate. They recognize the need for immediate help in cases of cardiact arrest and want something that will inform them about emergencies without being intrusive or over-demanding.

# RESEARCH

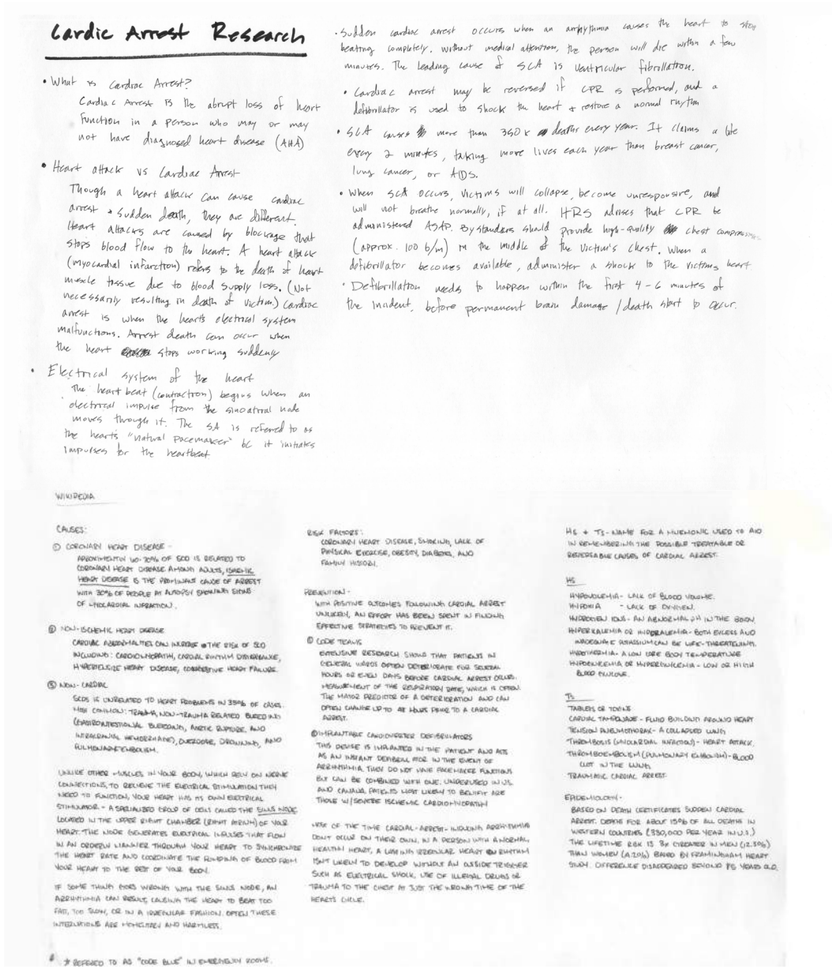
This section will provide some insight into our exploration of cardiac arrest, and development of the app's purposes and functions through benchmarking, research, and user scenario flow charts.

PulsePoint



# BENCHMARKING

After initial research, we looked for other applications on the market with similar purposes. One app in particular called Pulsepoint also aims to improve bystander assistance in certain emergency situations. Individuals who wish to be notified when an emergency is occurring near their location can download the app and participate in the service, and when 911 dispatch is notified of an emergency like a cardiac arrest, they are able to send an alert to nearby users' smartphones with the location of the victim(s). The app can be used to request assistance for a wide range of situations from a car accident to a house fire. While this is a practical idea, we saw multiple disadvantages that we could improve upon in our application. First, the app works through a dispatch service, meaning that the dispatchers are required the send out the alerts after notifying EMS, adding an extra step to a process that needs to be as fast as possible. This also means that the app is only available in communities that have opted for this service, which is still fairly limited at this time. Lastly, we thought that narrowing the scope of the idea down to a cardiac arrest specifically would allow us to create an app that could provide a more tailored experience with more extensive capabilities.

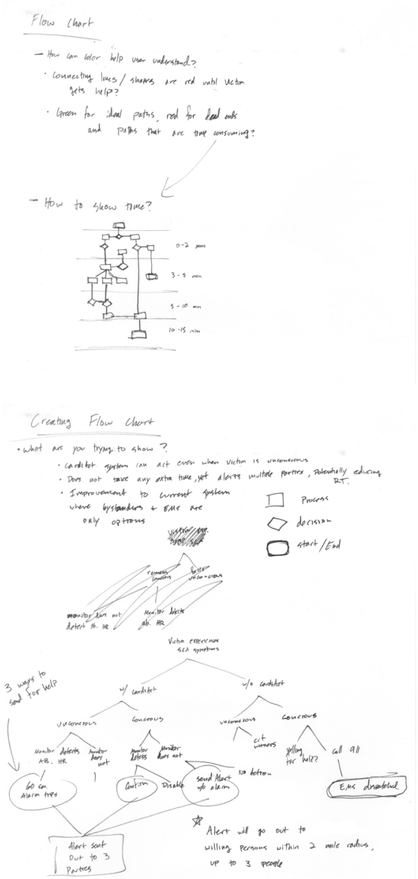


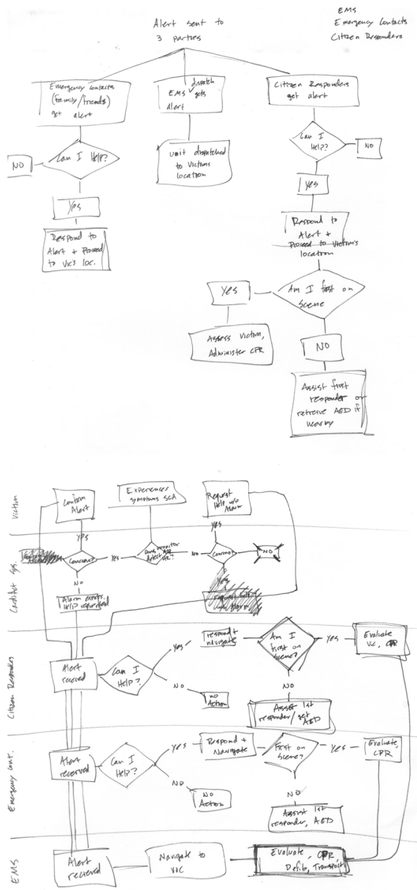

# INITIAL FINDINGS

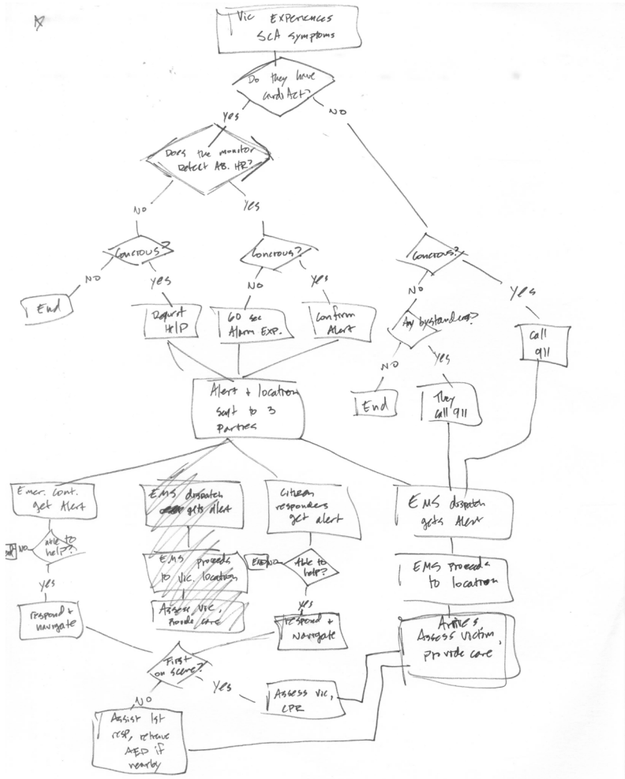
Our process began with extensive research into the human heart, and cardiac arrest. We needed to understand how it functioned, and what exactly was occurring during cardiac arrest in order to design for a scenario where it was happening. Some of the key findings that we discovered during this phase were that cardiac arrest is different from a heart attack, though most people often do not understand the separation. Whereas a heart attack is caused by a blocked artery, cardiac arrest is a malfunction of the heart's electrical system, causing a an irregular heartbeat which can either be dangerously fast (tachycardia), dangerously slow (bradycardia), or a complete stop. Cardiac arrest is typically very sudden, with little to no warning signs, and the victim will often lose consciousness and become unresponsive after heart function is lost, obviously making it impossible to seek help or notify anyone. We wanted to find a way to solve this issue and provide users with a way to notify people automatically should this occur. We also learned that while it only takes 4-6 minutes for brain damage and death to occur as a result of cardiac arrest, EMS response times vary greatly and are often higher than that. Reducing response time needed to be the top priority of our application.

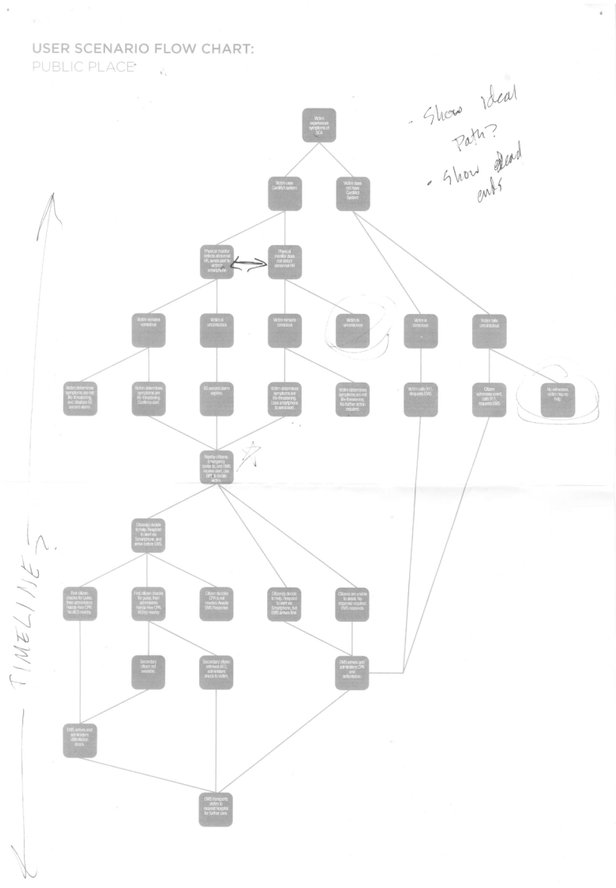
# TREATMENT

Once we learned more about the problem and identified some opportunities to improve it, the next step was looking into the process of treating a victim of CPR. Our application needed to be an unintrusive part of this scenario, so we needed to be very familiar with the procedures. There are two ways to provide care to a victim of cardiac arrest: CPR and defibrillation. CPR, or cardiopulmonary resuscitation, is the act of delivering rapid chest compressions to someone in order to maintain blood flow and prevent brain damage and death. However, this will only temporarily prolong a victim's life. Typically, in order to restore normal heart function, the heart needs to receive a shock from a defibrillator. Defibrillators are medical devices that deliver therapeutic doses of electrical energy to the heart via two electrodes, in a sense, "resetting" the heart's natural pace maker, the sinoatrial node. An AED, or Automated External Defibrillator, is a device that can diagnose and treat a patient via defibrillation, allowing it to be operated by an untrained user. These machines are often placed in public places like malls or schools and can be life-saving in cases of cardiac arrest, so we needed our users to have a way to locate these machines during an emergency.



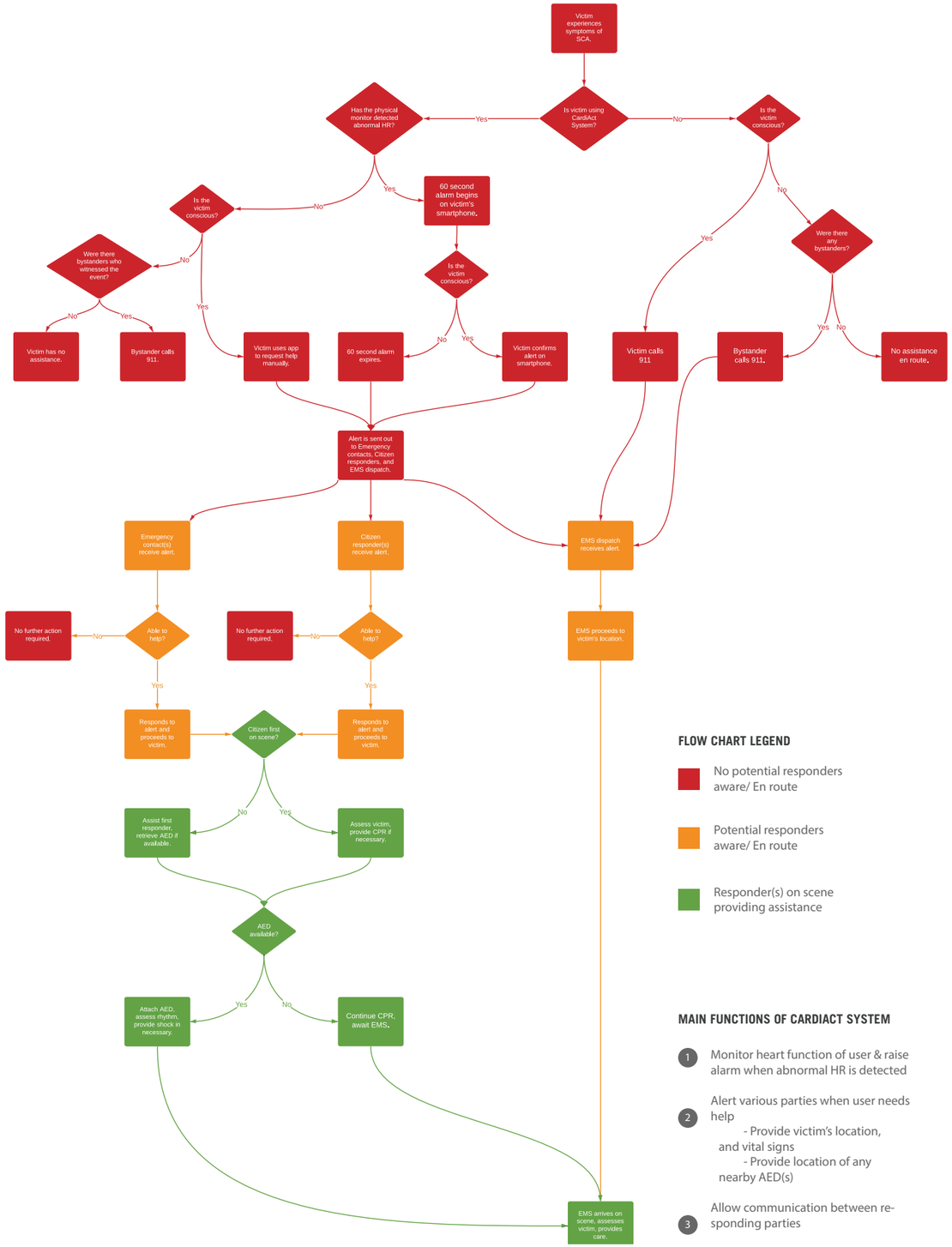




# FLOW CHARTS

After becoming familiar with the process of treating a victim of cardiac arrest, we needed to look into how our application would fit into this scenario. We began to develop flow charts in order to visually develop the functionality of the app, and identify opportunities where we could save time or solve an issue. This method helped us develop the solution to an automatic help request for an unresponsive victim. Because we did not want to invest time designing a physical product of our own, we looked into existing heart rate monitors, and discovered that there are products currently on the market that can take continuous heart rate readings, and communicate with smart phones via bluetooth. Knowing that the app could have access to that data, we were able to create a system where it could request help upon detecting an abnormal heart rate. In order to avoid excessive false alarms, an abnormality would trigger an alert to the victim's phone first, giving them 30 seconds to disable the alarm before a true emergency situation was declared. These diagrams also helped us refine our alert system, and decide who needed to be notified in these situations: nearby CPR certified users, emergency contacts specified by the victim, and 911 dispatch.



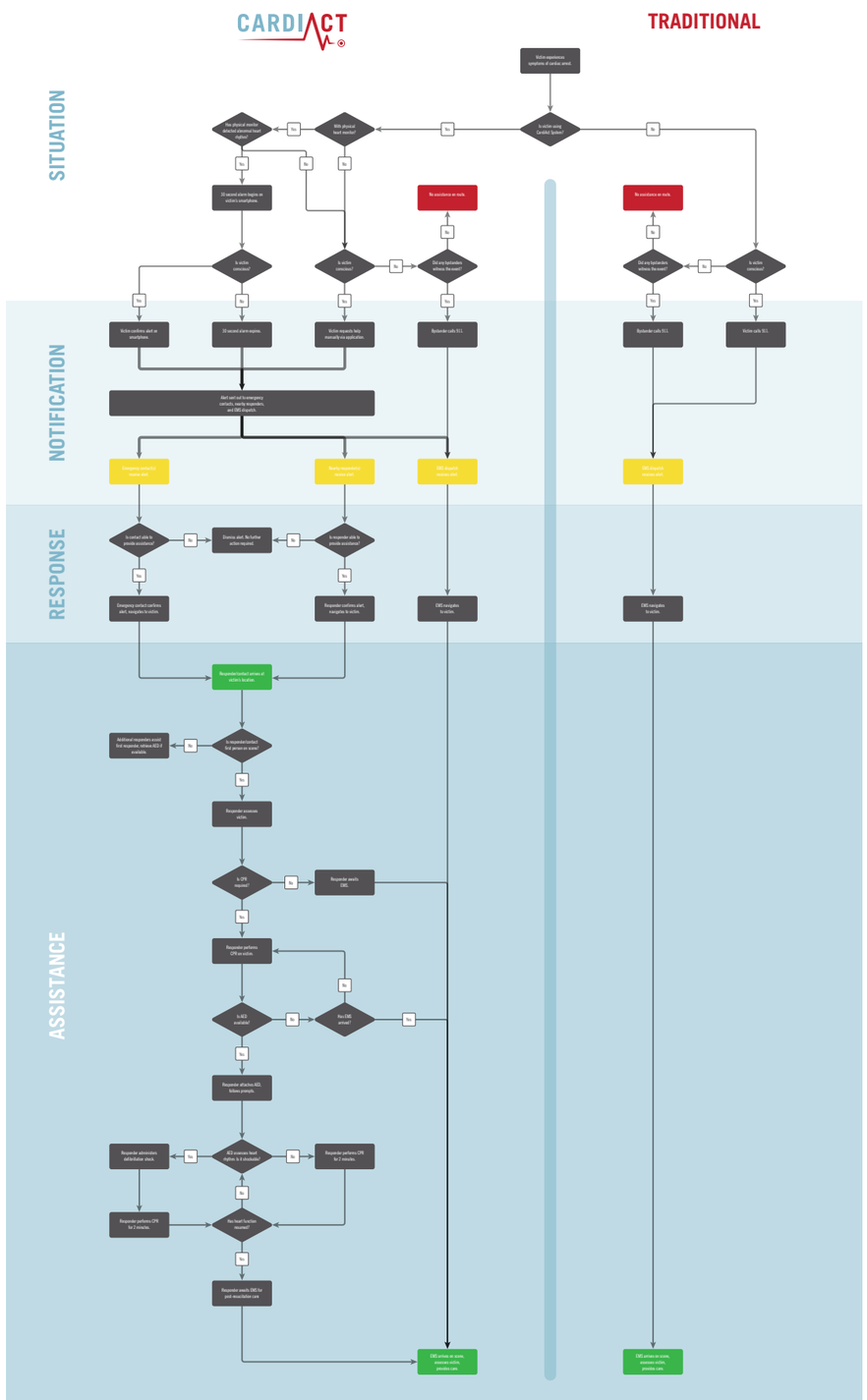

**FLOW CHART LEGEND**

- No potential responders aware/ En route
- Potential responders aware/ En route
- Responder(s) on scene providing assistance

**MAIN FUNCTIONS OF CARDIACT SYSTEM**

1. Monitor heart function of user & raise alarm when abnormal HR is detected
2. Alert various parties when user needs help
   - Provide victim's location, and vital signs
   - Provide location of any nearby AED(s)
3. Allow communication between responding parties

Bringing color into the charts allowed us to communicate the benefits and strengths of our system in comparison to the traditional path, and identify our most important functions. This was extremely insightful for us when it came to developing the visual hierarchy in our early wireframes.

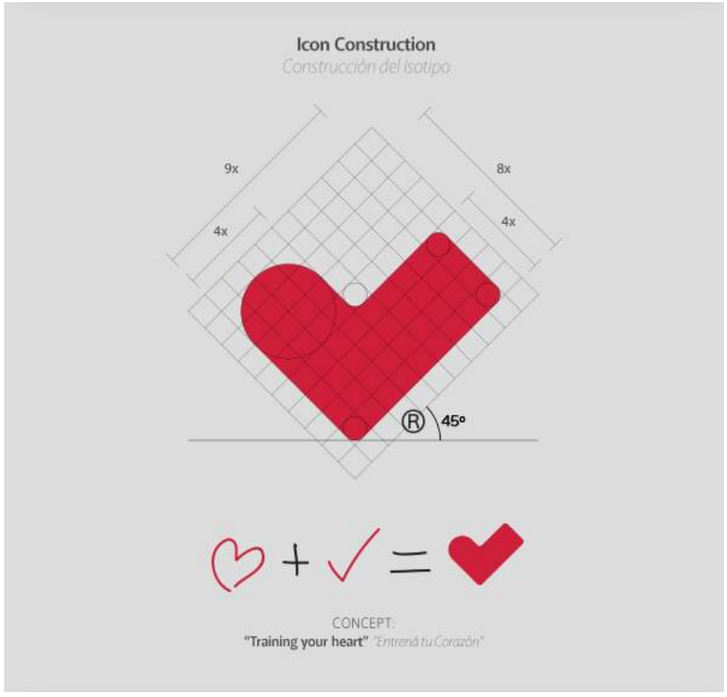



Our final flow chart broke down the process into different zones, communicating that the benefit of the application is the extra opportunities in the notification and response sections, that ideally allow for earlier assistance, IE a reduced response time, by crowdsourcing help from nearby users. It also shows the versatility of the system, providing solutions for more of the various situations than the traditional path.

# IDENTITY

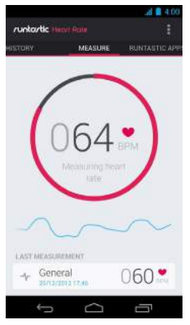
This section will show the development of the CardiAct brand, starting with visual inspiration and continuing through logo sketching, digital refinement, and additional brand elements.







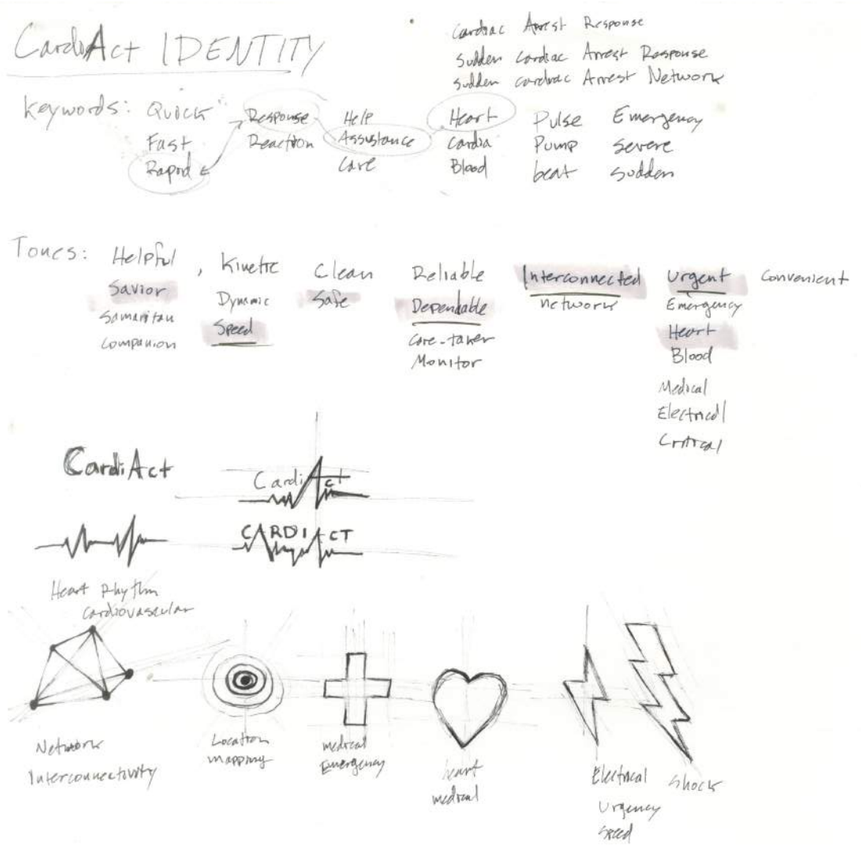

Veritas
DIAGNOSTICS

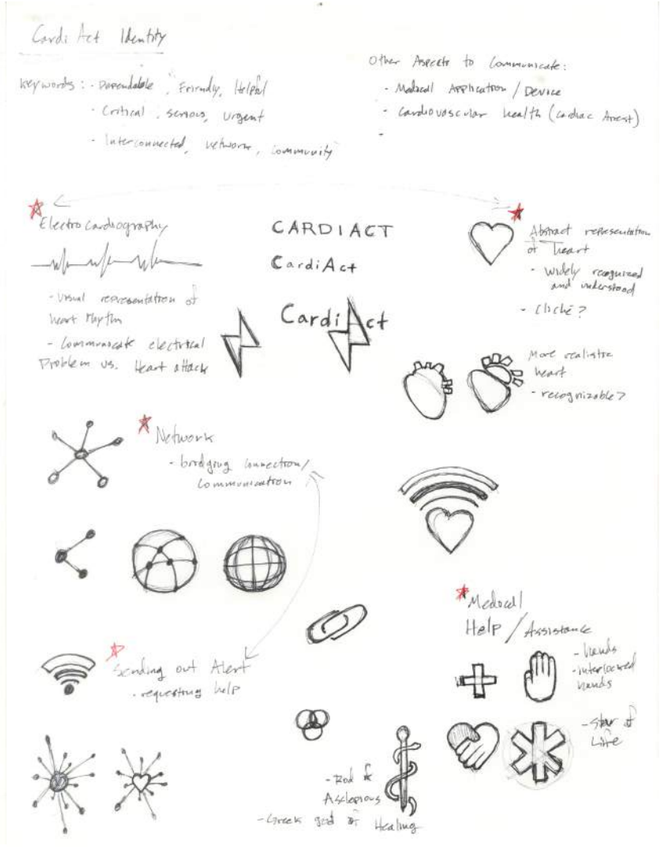



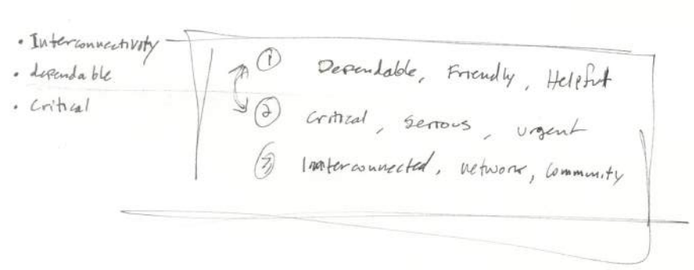


# INSPIRATION

Occurring simultaneously with the development of the application, was the development of the visual identity for CardiAct. We started off by benchmarking other identities in the medical field, specifically ones that utilized heart imagery. For the most part, these visuals are approachable and clean, but tended to lack the sense of speed and urgency we wanted to convey through our brand.

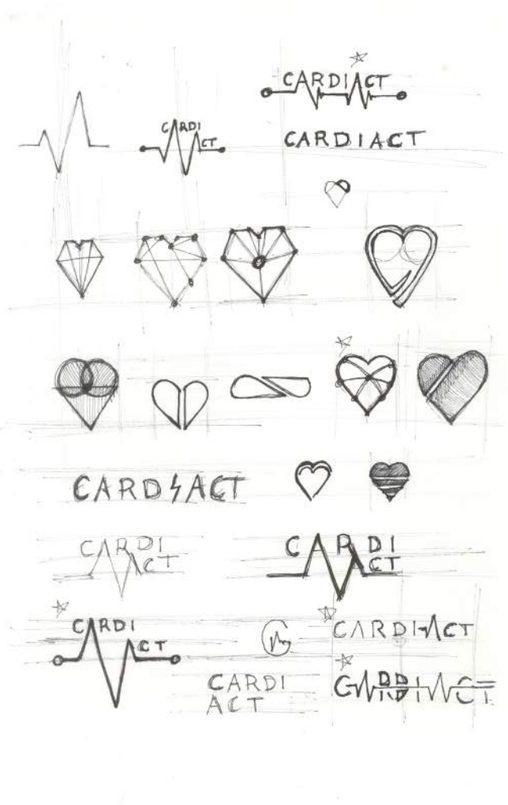


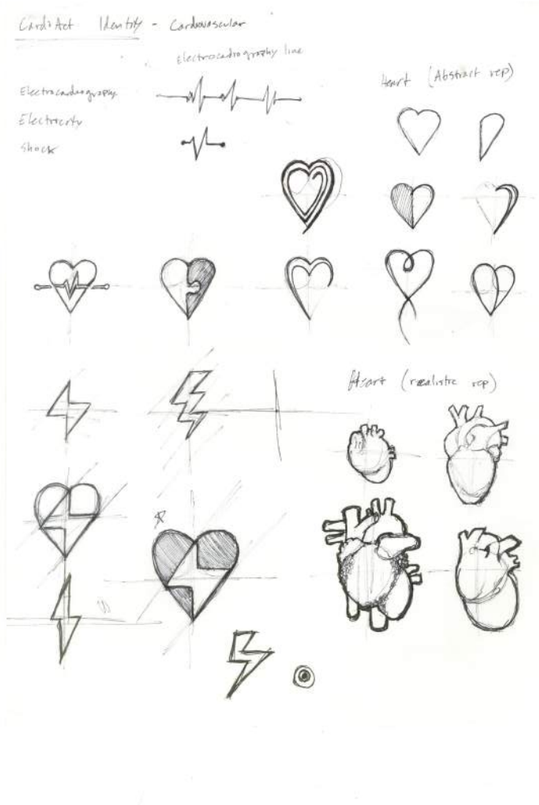



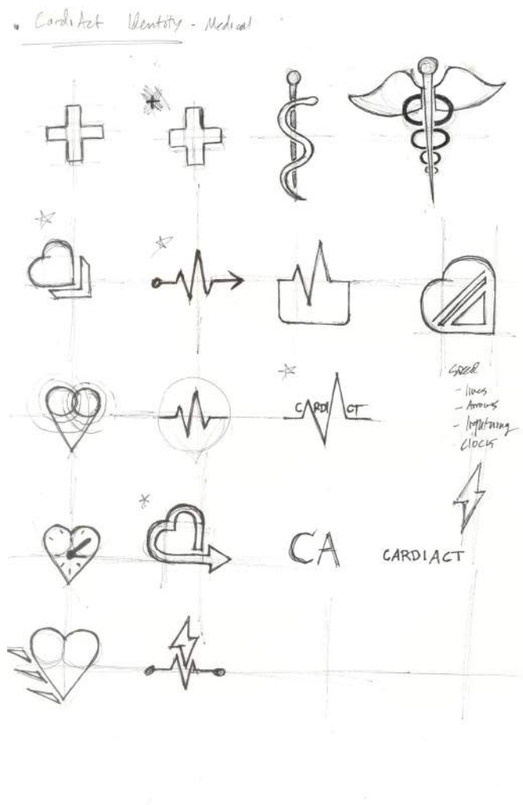



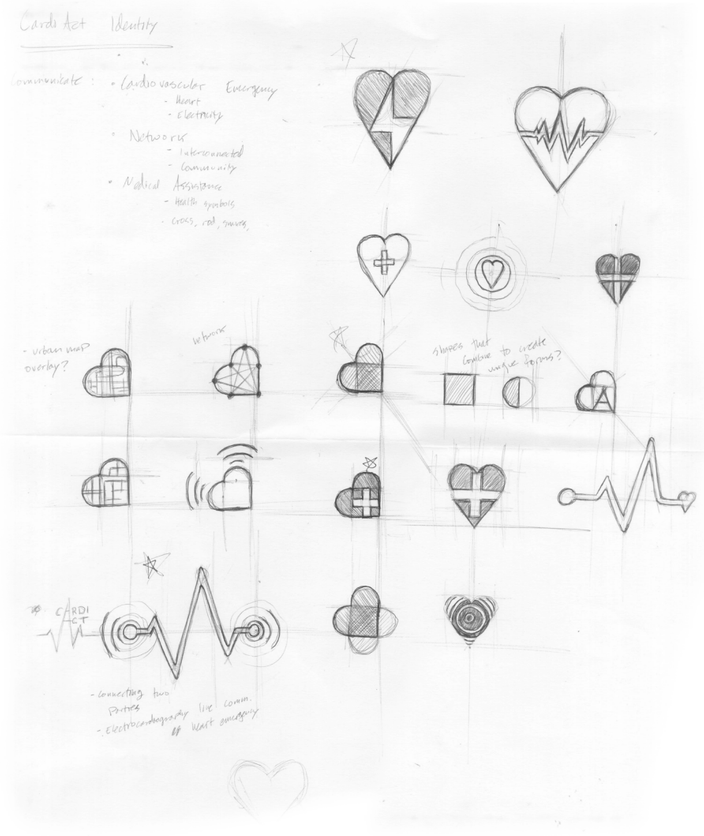

# BRAINSTORMING

Prior to initial logo sketching, we brainstormed a series of terms that we wanted to associate with our identity, and narrowed it down to 3 concepts. We wanted to be approachable and helpful, but balance that friendliness with a sense of urgency and speed. Lastly, we wanted to convey the idea of connectivity, hinting at the navigation to the victim in these scenarios.



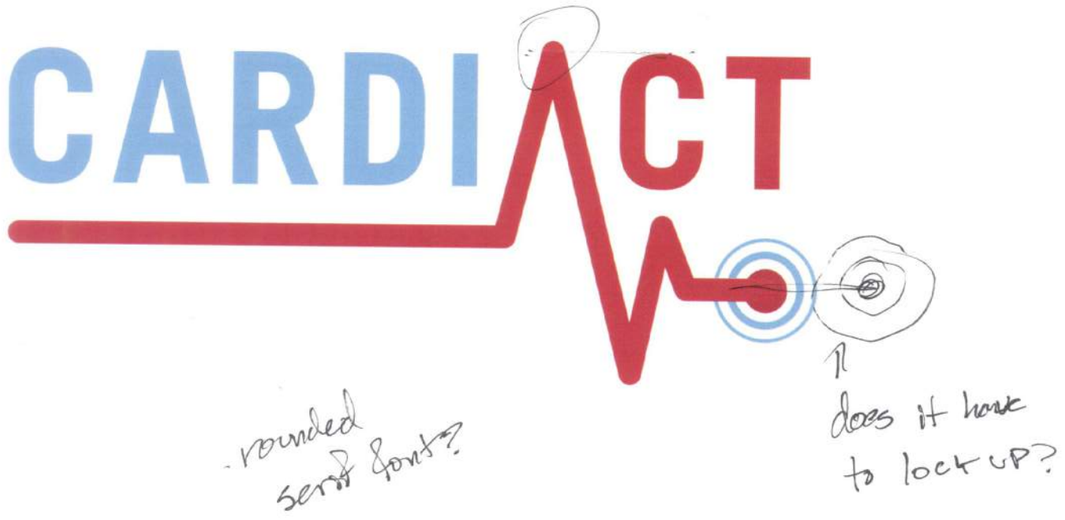



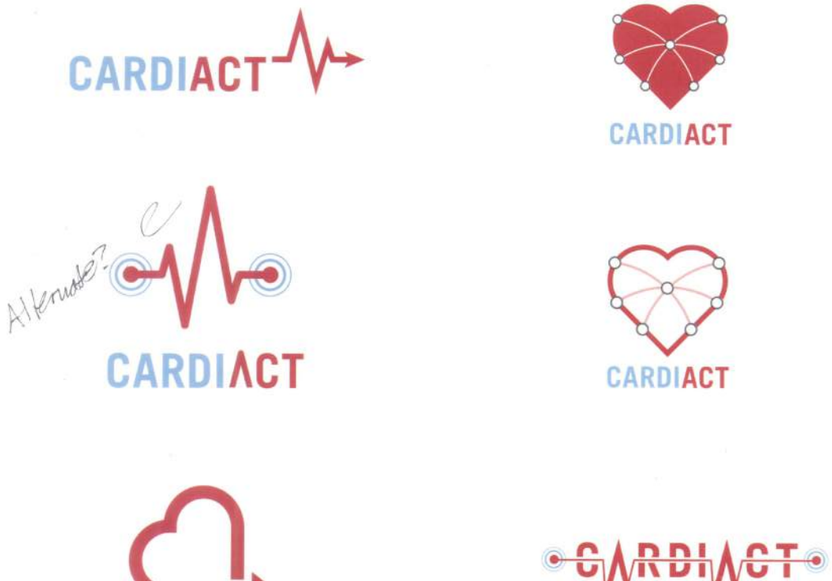




# LOGO SKETCHING

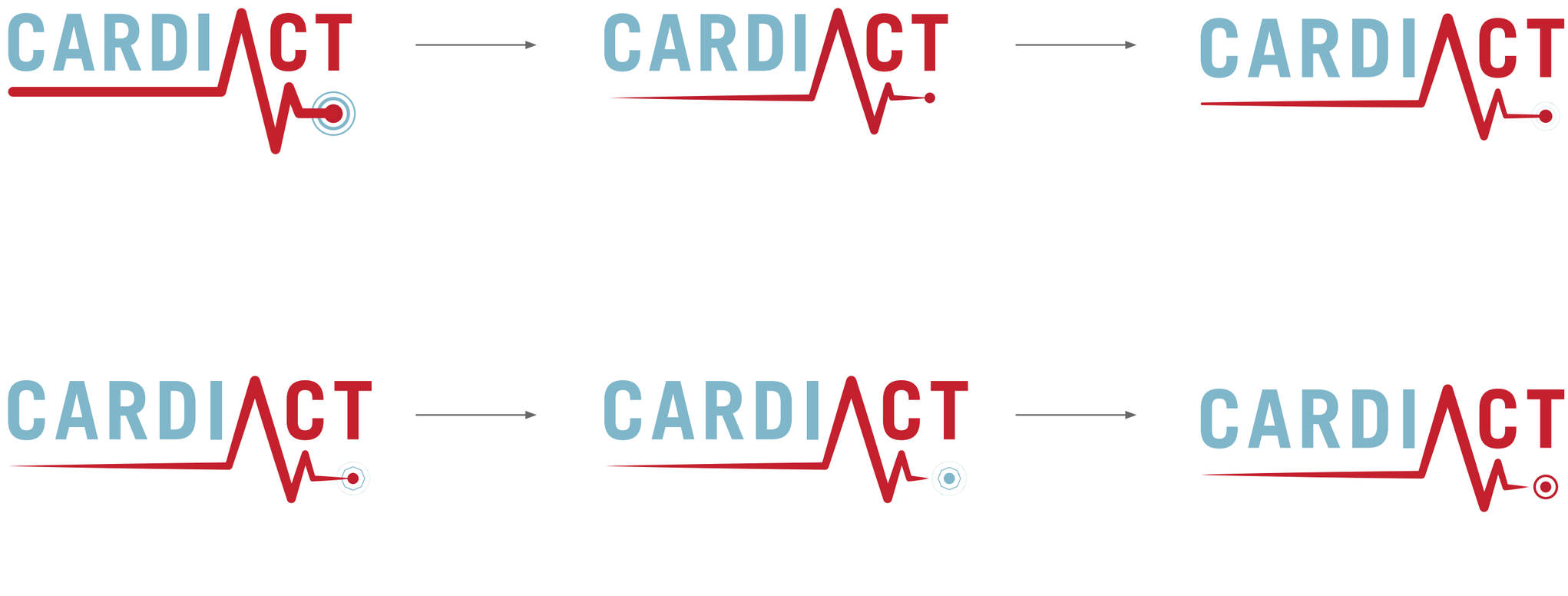
These initial logo sketches explored a multitude of solutions in order to reach our communication objectives. The feedback we received on these sketches led us to believe that the strongest concepts were those that utilized the electrocardiography line incorporated with the type. The realistic representations of the heart were too literal, yet the abstract heart shapes were commonly associated with the emotional meaning (love, affection, etc.)



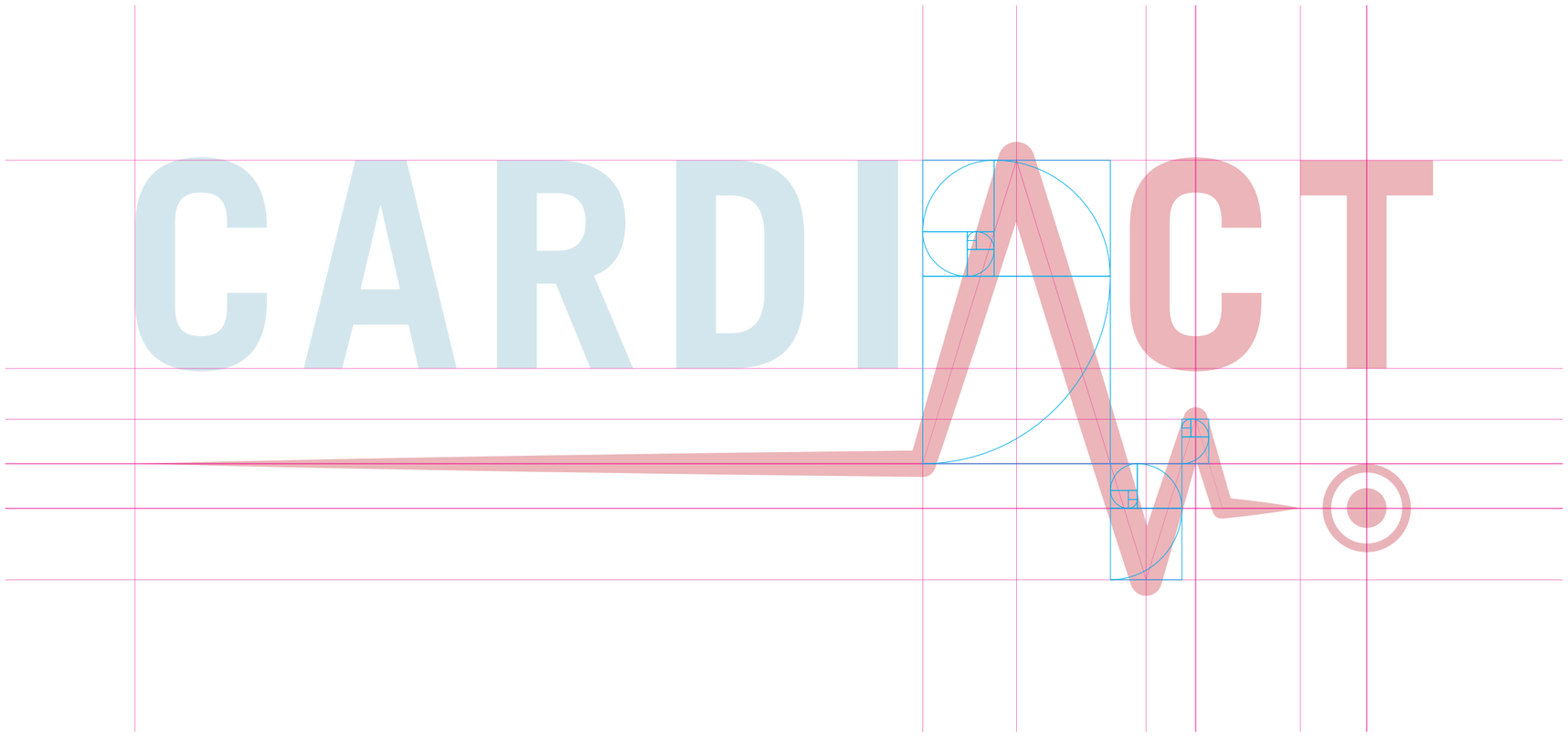

# LOGO DEVELOPMENT

These 7 digital concepts emerged from the initial sketches, and color was introduced. After multiple critiques, it was decided that the largest concept was the strongest in its communication. The stylized electrocardiography line not only conveys heart health, it adds emphasis to the “Act” in the name, implying quick action. The concentric circles at the end of the line communicate an arrival at a destination, giving the line a secondary meaning as a navigation path.




# LOGO REFINEMENT

From there, refinements were made to the different elements. The angles of the line were based on the proportions of the golden ratio to give the scale progression a pleasant appearance. The concentric circles were simplified so as not to become too faint at a small scale, and subtle changes were made to the kerning of the type allowing it to feel solid and united without too much tension between the elements.




Final logo


Final logo


C:16
M:100
Y:93
K:06

C:75
M:68
Y:67
K:60

C:70
M:64
Y:60
K:0

C:60
M:15
Y:15
K:0

C:60
M:0
Y:90
K:0

C:5
M:5
Y:5
K:5

**Trade Gothic**
**BOLD**
Regular
Light

**Open Sans**
**BOLD**
Regular
Light

# BRAND ELEMENTS

Additional brand elements were designed based upon the logo work and identity concepts. The application icon utilizes elements from the logo mark to reinforce the brand. The color palette combines a strong red that conveys urgency and medicine with a softer blue to give the viewer a sense of approachability and trust. Our primary typeface choice was trade gothic, which has a bold and intense feeling when in an uppercase application. We chose Open sans as our web-safe secondary typeface because it paired well aesthetically with trade gothic and offered great legibility on screen at small sizes.

# APP DEVELOPMENT

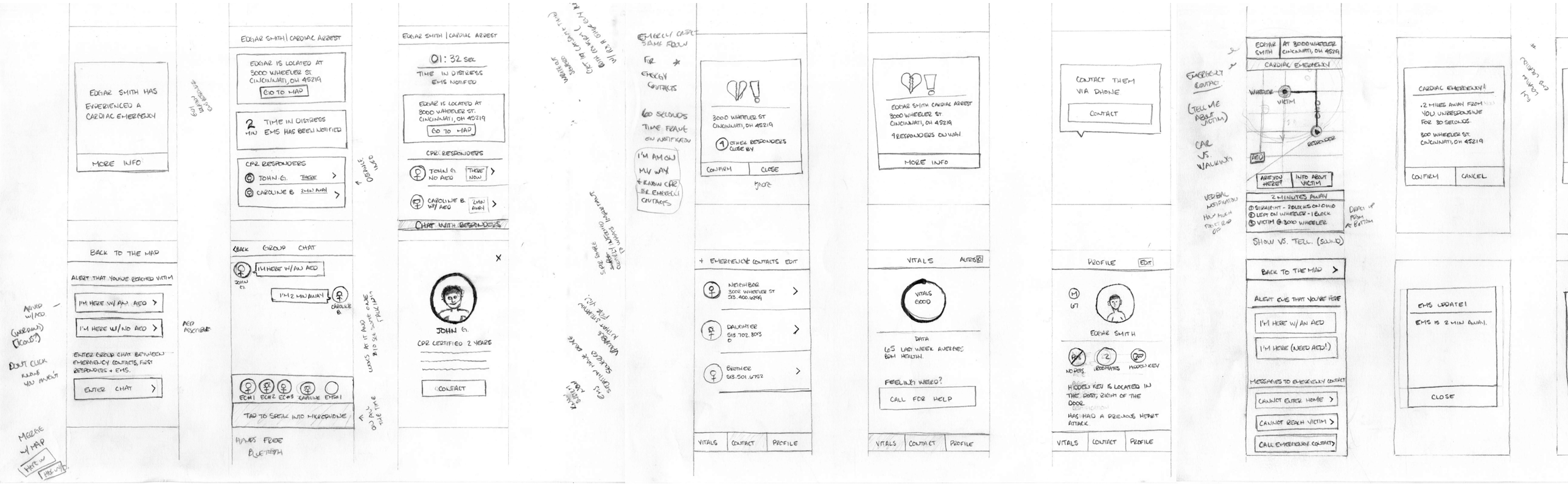
This section will show the development of the application, from initial wireframes, through paper prototyping, wireframes, and initial visual design.

# APP DEVELOPMENT

Our application was built to connect CPR certified responders to at-risk individuals who experience cardiac arrest. The app was built to reduce response times and increase survival rates. By researching, interviewing, user testing, and iterating we created a simple product that provides the information and functions necessary to achieve this goal. CardiAct works by pairing with a physical heart rate monitor, and when a dangerous heart rate is detected, an alert is sent our to nearby CPR Responders who have signed up for this service. Once an alert is confirmed, critical information is provided to get to the victim, locate any nearby AEDs, and provide a medium to communicate with other responders and emergency contacts. The app is divided into two separate modes, Emergency and Static. Static Mode allows a user to see their heart rate reading from the wearable heart rate monitor, add or edit/view emergency contacts, and edit/view personal and medical info. Emergency mode provides users with a map to the victim, a group chat allowing a victim's emergency contacts and CPR responders to communicate transparently, and a status section that provides essential information about the victim's real time status and additional info about the responders.


# INITIAL WIREFRAMES

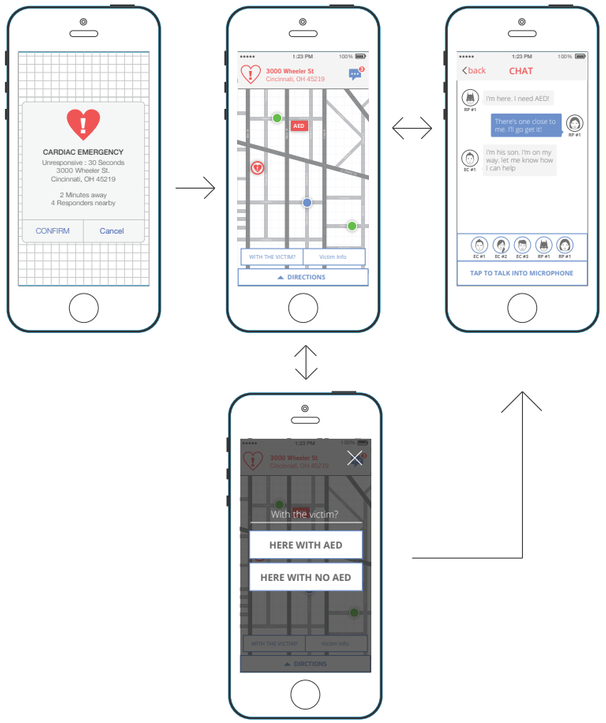
Based on our research and interviews, we began to develop our application beginning with sketching. This was to explore and develop ideas about how our app would be structured, how navigation would function, and, most importantly, developing content flows that made sense for our audience. During this initial phase, we took the pieces that made the most sense for our concept, and combined them together to create our paper prototype and flush out our ideas.



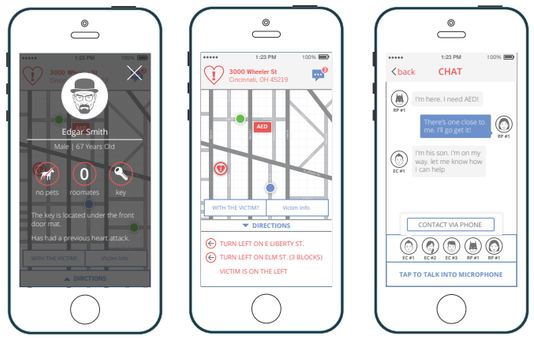

# PAPER PROTOTYPE

The next part of our design process was creating a paper prototype. from our initial exploratory sketches, we took the best ideas and concepts that were working and continued to flush them out. From here we created a paper prototype that allowed us to test and develop our ideas further as well as allow us to finalize content and mobile structure.

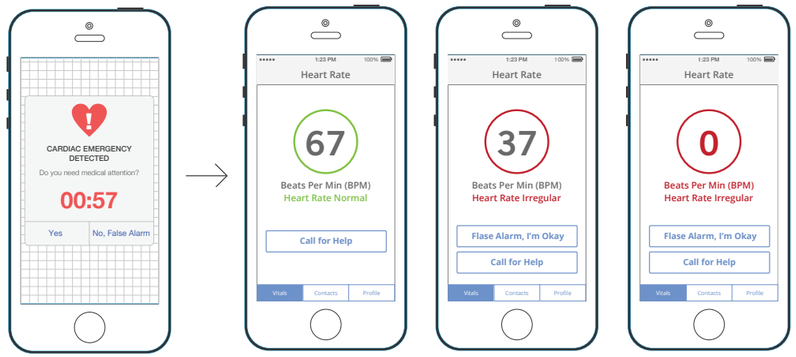
First Responder flow

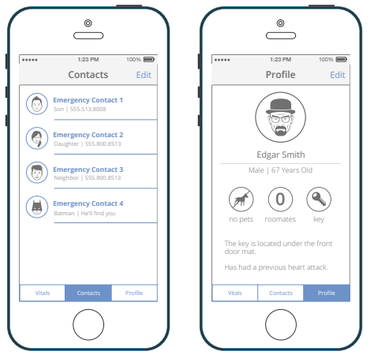



Secondary Screens




At- Risk Profile




# DIGITAL WIREFRAMES

After completing the paper prototype, we developed digital wireframes. Here we concentrated on taking revisions and additions from the paper prototype and refined our flow, hierarchical structure and typography along with developing graphic elements. From this we began to take wireframe to PSD and define our graphic style.


# INITIAL VISUAL DESIGN

After we finished the digital wireframes, we developed the look and feel for our application, implementing a 3 tab navigation system to simplify the app after receiving valuable feedback from our paper prototypes. From our developed brand standards, we used red as the dominant color to associate with emergency. Since we developed the content structure and hierarchy in earlier stages, visuals design was our main focus going into User Testing.

# USER TESTING

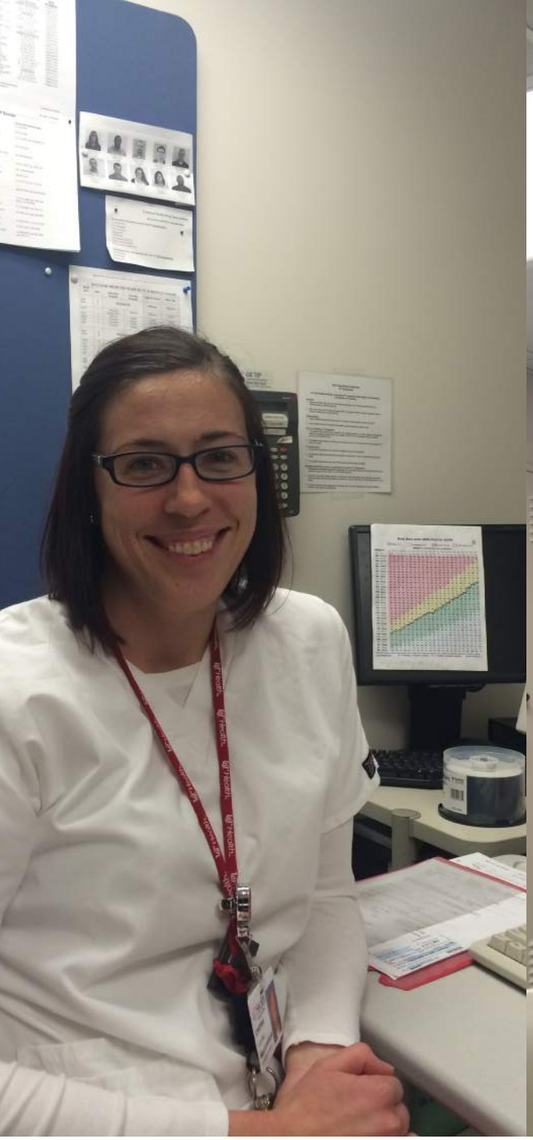
This section will explain our process of user testing. It will cover our audience, their experiences, and the key findings that resulted from our interactions.

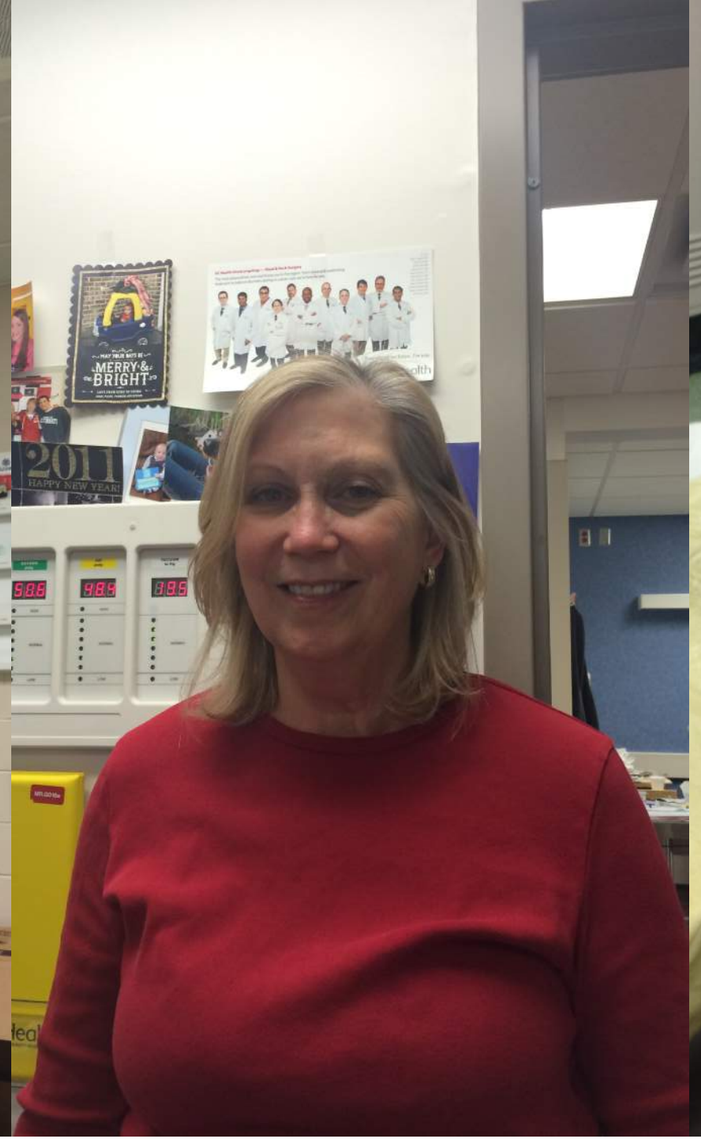
# OVERVIEW

User testing proved to be a huge part of our final prototype. By testing on our target audience we were able to create a better interface and gain valuable knowledge.

To test our initial prototype, we visited University Hospital at the University of Cincinnati where we tested and interviewed five employees who are CPR certified in Basic Life Support (BLS).

We conducted a mix of Obtrusive and Unobtrusive testing. For three of the five testers we let them explore the app, having them speak aloud their thoughts as they went though, while we were quiet and documenting if what they were seeing is what we expected or any areas that proved to be confusing. We did not tell them what the app was about or who it was for. For the other two testers, we gave them an introduction to the app and who it was for. We asked them to complete scenarios and then stepped in if they questions or were lost.





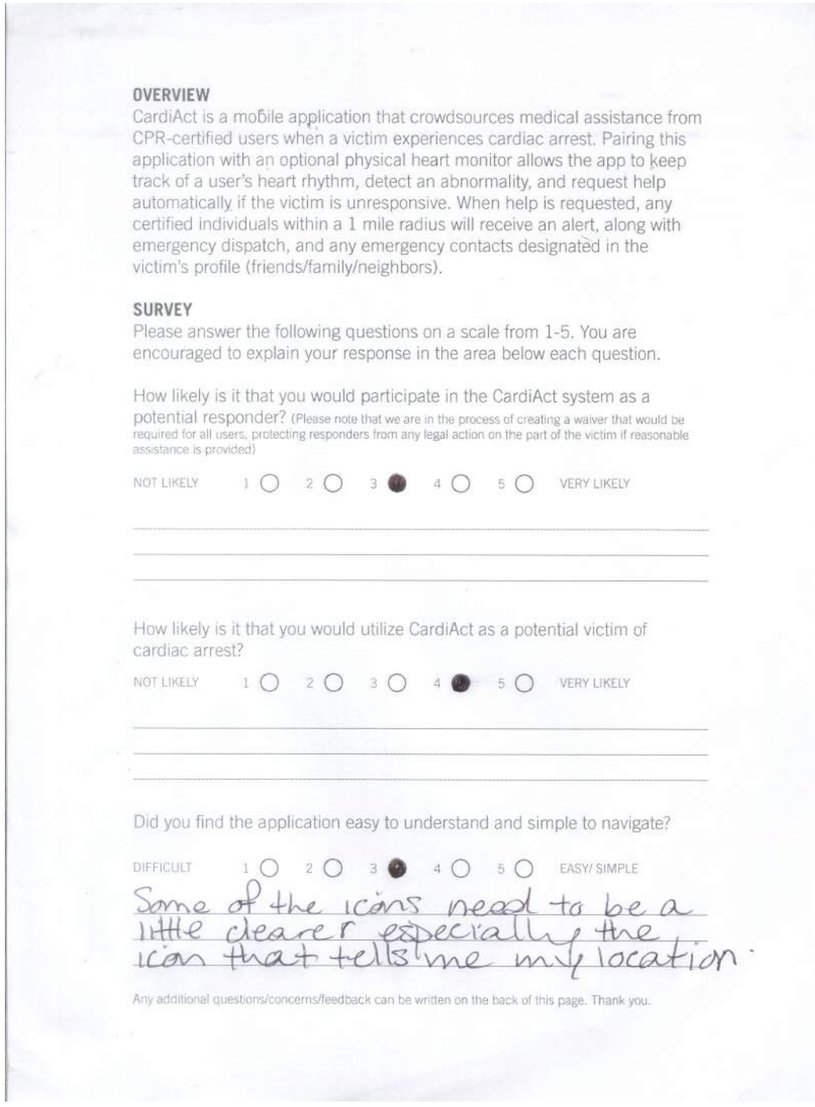
# TEST SUBJECTS

Cindy, Molly, Donna, Adam and Sharron were our user testers. All of them are employed at University Hospital. Their age groups covered mid twenties to late fifties. They are all CPR certified for Basic Life Support (BLS).


BEFORE AFTER

# KEY FINDINGS

In User Testing we found many opportunities to improve the app. There were many little tweaks that we made but there were three key issues that were brought to light. These issues were that people didn't know who they were on the map, who the victim was and what side of the street the victim was on. Because we have other responders on the screen as well, some where a little confused. They also didn't know which direction they were facing. To solve this, we brought up the contrast between the user and other people involved. We refined the icon of the victim and added rings that expand, relating the user's icon to the victim's. We also added an arrow to let the user know which direction they are facing. To solve the issue of relation to which side of the street the victim is located, we recreated the map, including buildings and structure that would provide the user with a more pinpoint location of the victim.



**OVERVIEW**
CardiAct is a mobile application that crowdsources medical assistance from CPR-certified users when a victim experiences cardiac arrest. Pairing this application with an optional physical heart monitor allows the app to keep track of a user's heart rhythm, detect an abnormality, and request help automatically if the victim is unresponsive. When help is requested, any certified individuals within a 1 mile radius will receive an alert, along with emergency dispatch, and any emergency contacts designated in the victim's profile (friends/family/neighbors).

**SURVEY**
Please answer the following questions on a scale from 1-5. You are encouraged to explain your response in the area below each question.

How likely is it that you would participate in the CardiAct system as a potential responder? (Please note that we are in the process of creating a waiver that would be required for all users, protecting responders from any legal action on the part of the victim if reasonable assistance is provided)

NOT LIKELY 1 ○ 2 ○ 3 ● 4 ○ 5 ○ VERY LIKELY

How likely is it that you would utilize CardiAct as a potential victim of cardiac arrest?

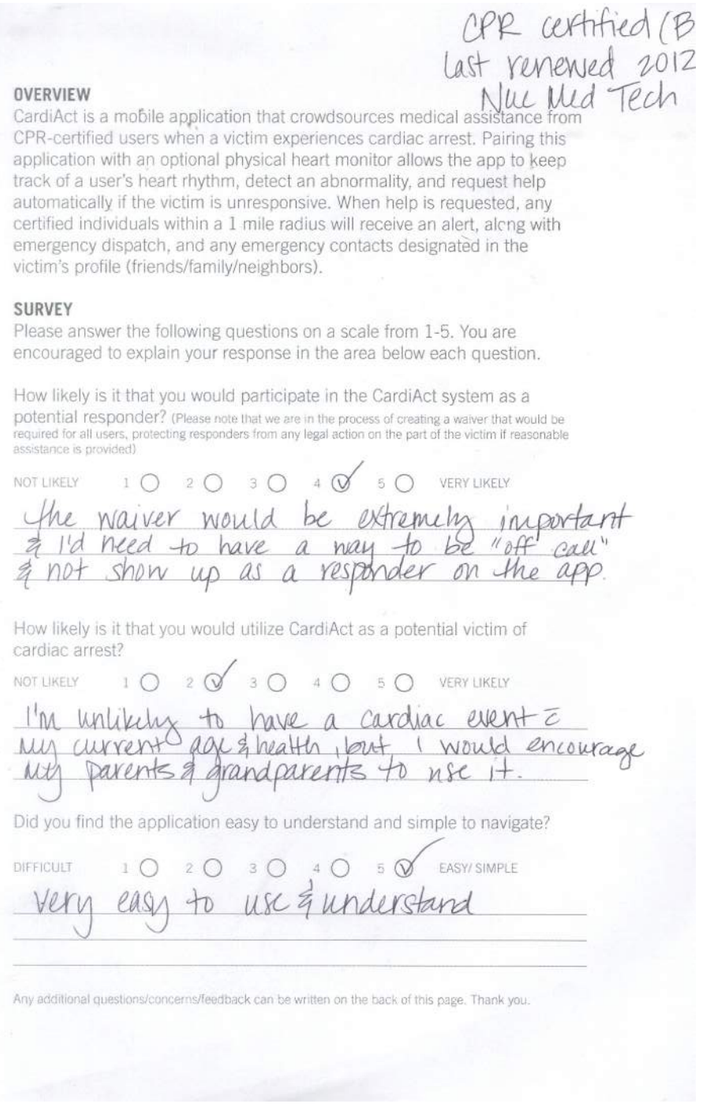
NOT LIKELY 1 ○ 2 ○ 3 ○ 4 ● 5 ○ VERY LIKELY

Did you find the application easy to understand and simple to navigate?

DIFFICULT 1 ○ 2 ○ 3 ● 4 ○ 5 ○ EASY/ SIMPLE

Some of the icons need to be a little clearer especially the icon that tells me my location.

Any additional questions/concerns/feedback can be written on the back of this page. Thank you.



CPR certified (B
Last renewed 2012
NW Med Tech

**OVERVIEW**
CardiAct is a mobile application that crowdsources medical assistance from CPR-certified users when a victim experiences cardiac arrest. Pairing this application with an optional physical heart monitor allows the app to keep track of a user's heart rhythm, detect an abnormality, and request help automatically if the victim is unresponsive. When help is requested, any certified individuals within a 1 mile radius will receive an alert, along with emergency dispatch, and any emergency contacts designated in the victim's profile (friends/family/neighbors).

**SURVEY**
Please answer the following questions on a scale from 1-5. You are encouraged to explain your response in the area below each question.

How likely is it that you would participate in the CardiAct system as a potential responder? (Please note that we are in the process of creating a waiver that would be required for all users, protecting responders from any legal action on the part of the victim if reasonable assistance is provided)

NOT LIKELY 1 ○ 2 ○ 3 ○ 4 ✓ 5 ○ VERY LIKELY

The waiver would be extremely important & I'd need to have a way to be "off call" & not show up as a responder on the app.

How likely is it that you would utilize CardiAct as a potential victim of cardiac arrest?

NOT LIKELY 1 ○ 2 ✓ 3 ○ 4 ○ 5 ○ VERY LIKELY

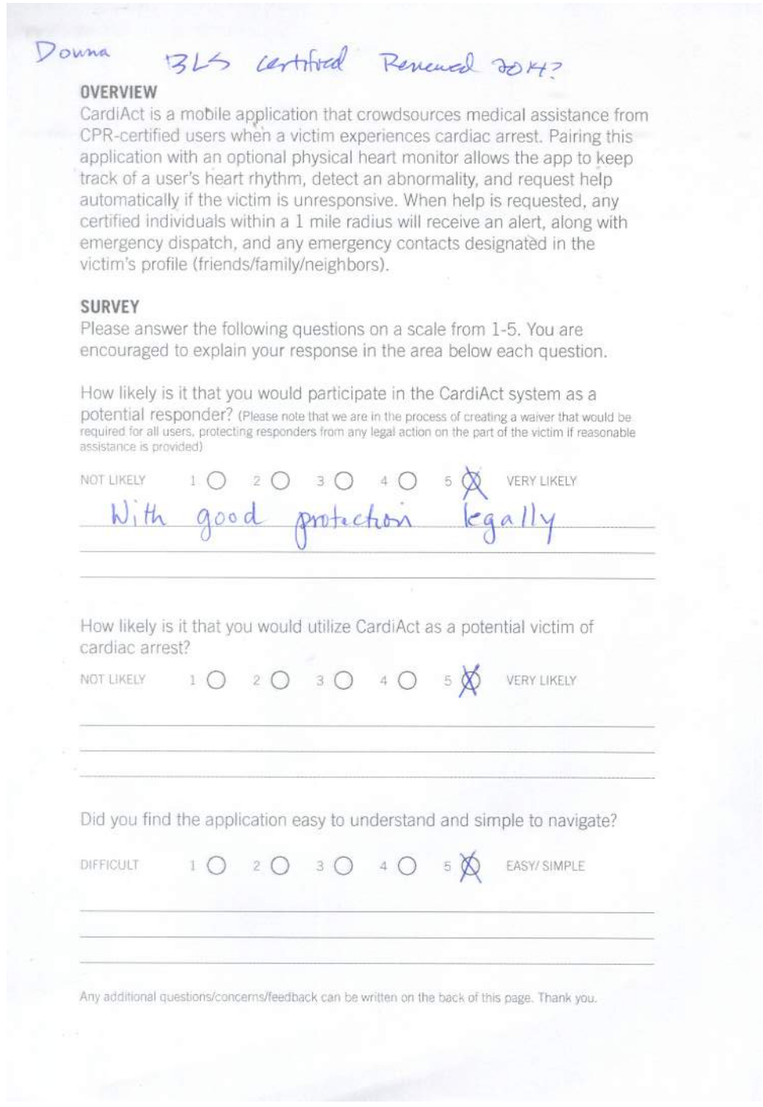
I'm unlikely to have a cardiac event = my current age & health, but I would encourage my parents & grandparents to use it.

Did you find the application easy to understand and simple to navigate?

DIFFICULT 1 ○ 2 ○ 3 ○ 4 ○ 5 ✓ EASY/ SIMPLE

very easy to use & understand

Any additional questions/concerns/feedback can be written on the back of this page. Thank you.



Donna BLS certified Renewed 2014?

**OVERVIEW**
CardiAct is a mobile application that crowdsources medical assistance from CPR-certified users when a victim experiences cardiac arrest. Pairing this application with an optional physical heart monitor allows the app to keep track of a user's heart rhythm, detect an abnormality, and request help automatically if the victim is unresponsive. When help is requested, any certified individuals within a 1 mile radius will receive an alert, along with emergency dispatch, and any emergency contacts designated in the victim's profile (friends/family/neighbors).

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NOT LIKELY 1 ○ 2 ○ 3 ○ 4 ○ 5 X VERY LIKELY

With good protection legally

How likely is it that you would utilize CardiAct as a potential victim of cardiac arrest?

NOT LIKELY 1 ○ 2 ○ 3 ○ 4 ○ 5 X VERY LIKELY

Did you find the application easy to understand and simple to navigate?

DIFFICULT 1 ○ 2 ○ 3 ○ 4 ○ 5 X EASY/ SIMPLE

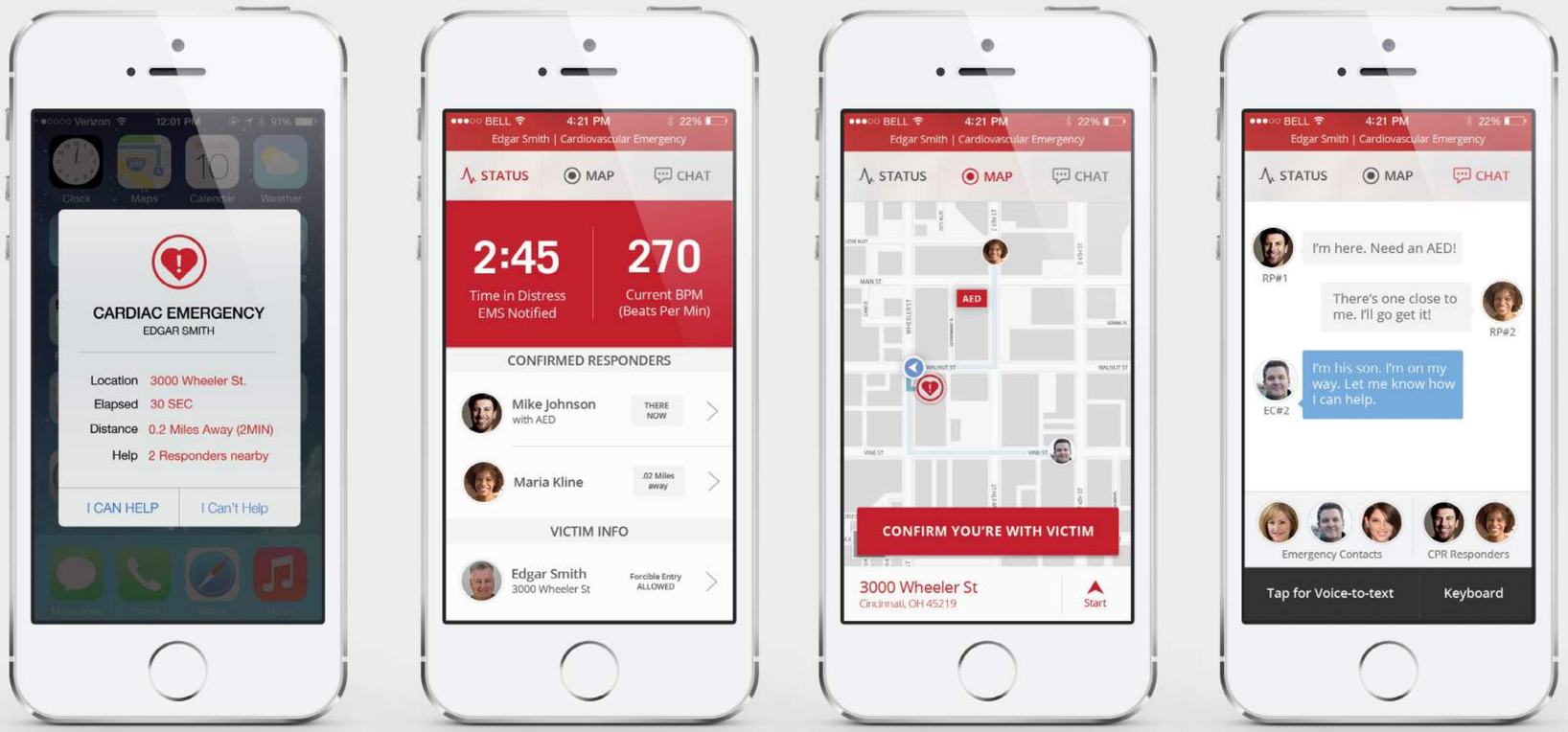
Any additional questions/concerns/feedback can be written on the back of this page. Thank you.

# SURVEYS

In addition to taking notes about their experiences, we asked our test subjects to fill out a survey, asking how likely it would be for them or a loved one to utilize this service. We also asked them to rank the app on it's ease of use and simplicity, and elaborate whenever possible, helping us identify key issues.

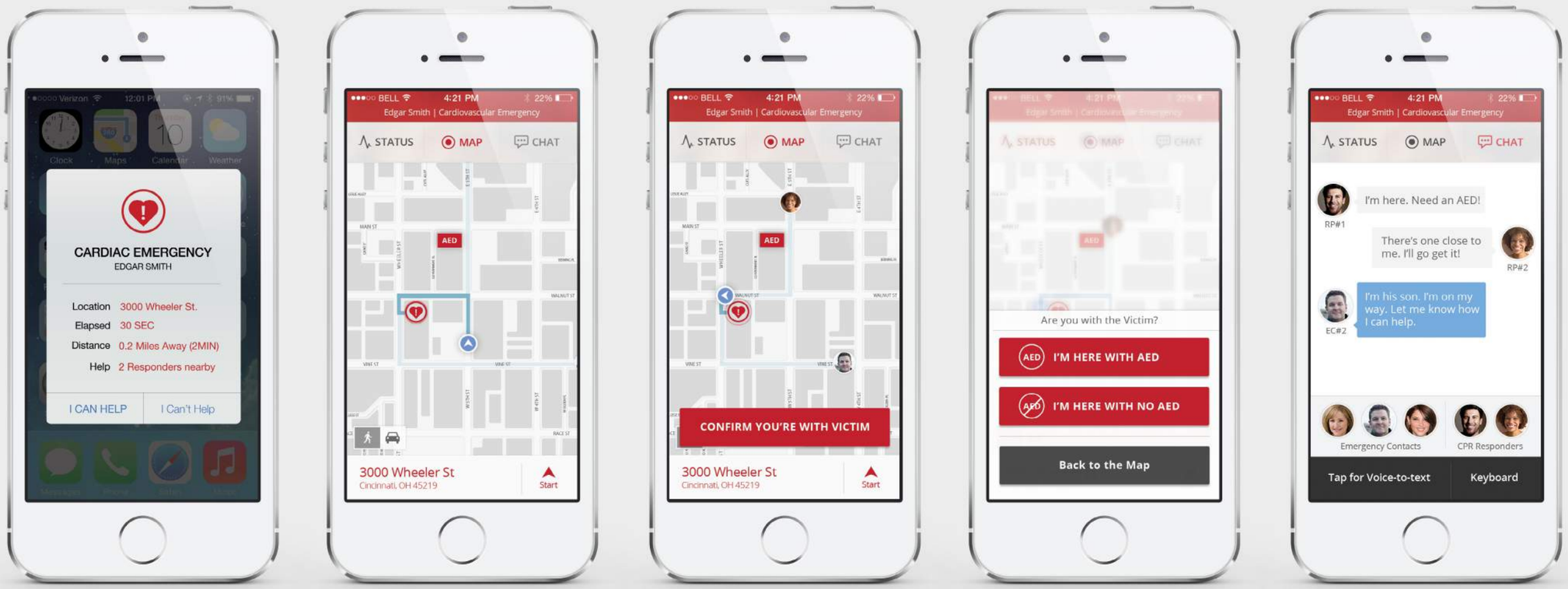
# FINAL APP

This section will cover the functionality of our finished application, explaining both the static and emergency modes, as well as secondary screens.




# EMERGENCY MODE

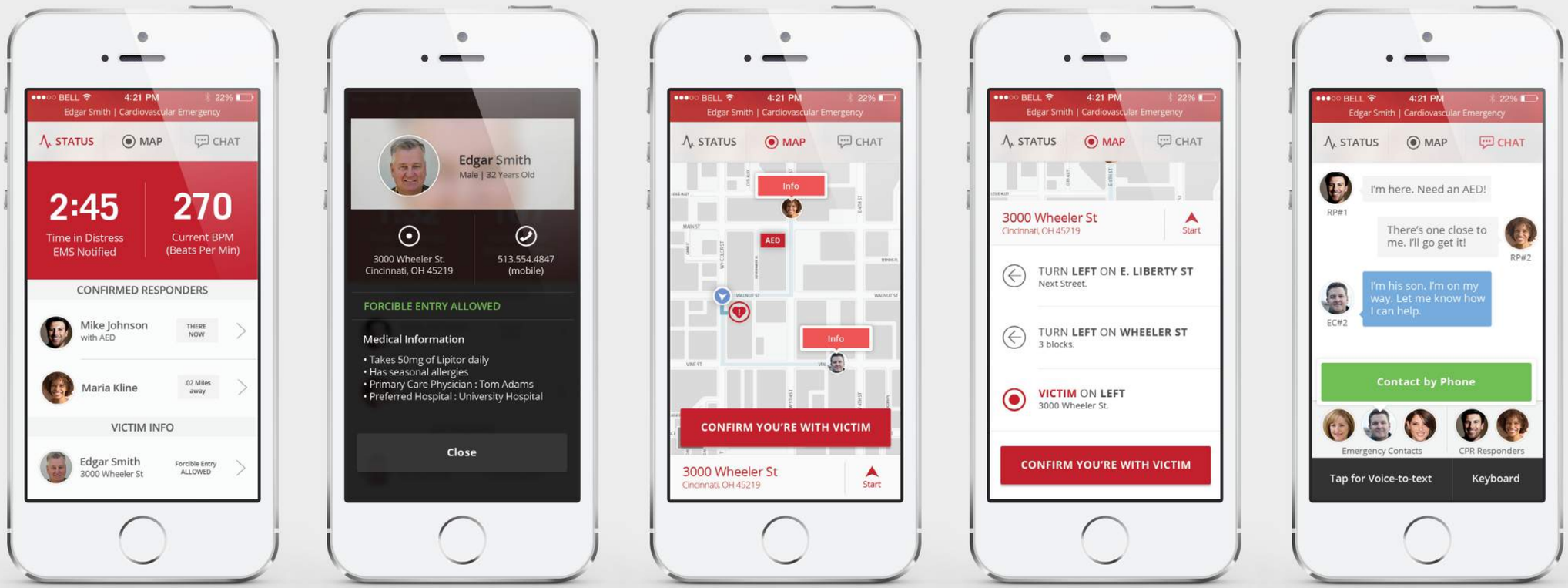
CardiAct displays emergency mode when the victim requests help, or a dangerous heart rate is detected with the heart monitor. The CPR Responder(s) will be sent an alert allowing them to view the map, and provide the victims location along with other vital information needed to help save the victim's life. Some changes were implemented based on user testing, including the addition of a dominant blue line leading the responder to the victim, as well as subtle lines that showed the routes of other responders. We recreated the map with more detail to better pinpoint where the victim is.




# ALERT + MAP

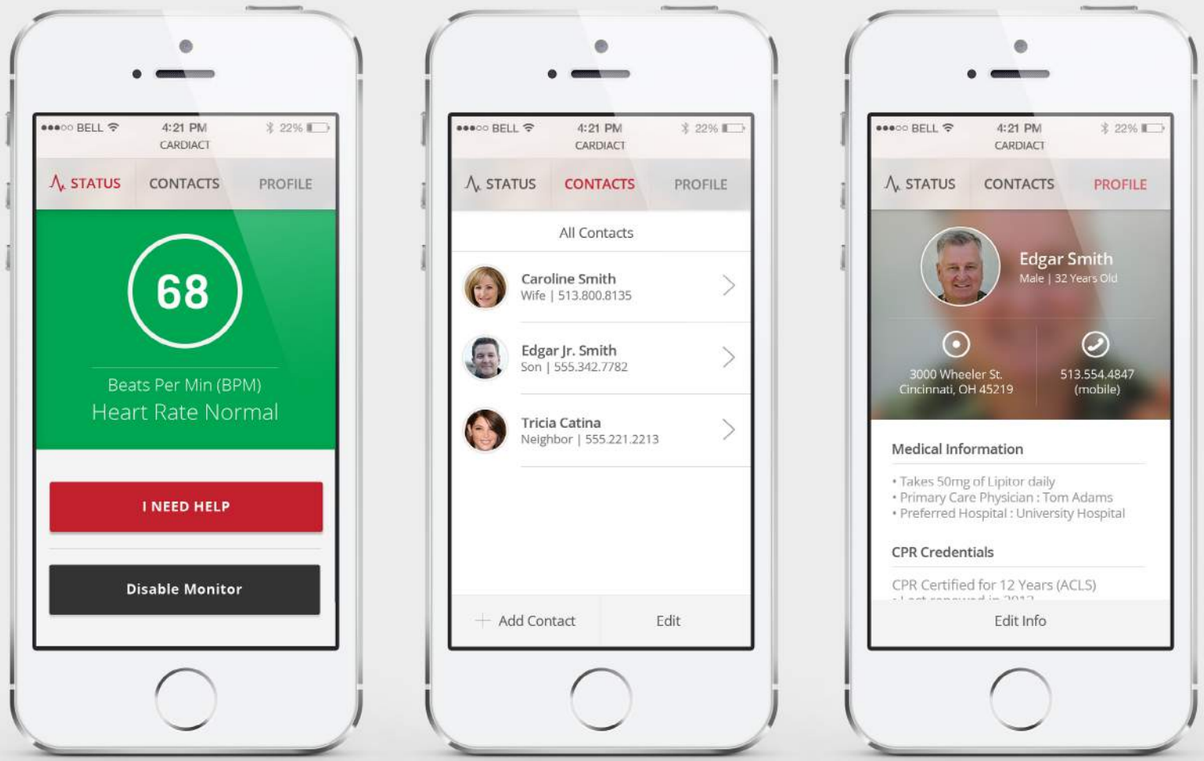
The alert screen is sent to certified bystanders who signed up to be a part of Cardiact. When received, it gives them the victims name, location, how long the victim has been in distress, how far the responder is from the victim, along with any other responders that have accepted the same alert. When a responder clicks that they can help, they are taken to the map tab. The Map tab allows the user to see their location in relationship to the victim, responders, EMS, and AEDs. When a responder approaches the victim, an option will appear asking them to confirm their arrival on scene.

The Chat tab allows for open communication between the victim, responders, and emergency contacts. Users can utilize speech recognition to populate messages, or contact any other parties via phone by tapping their image.



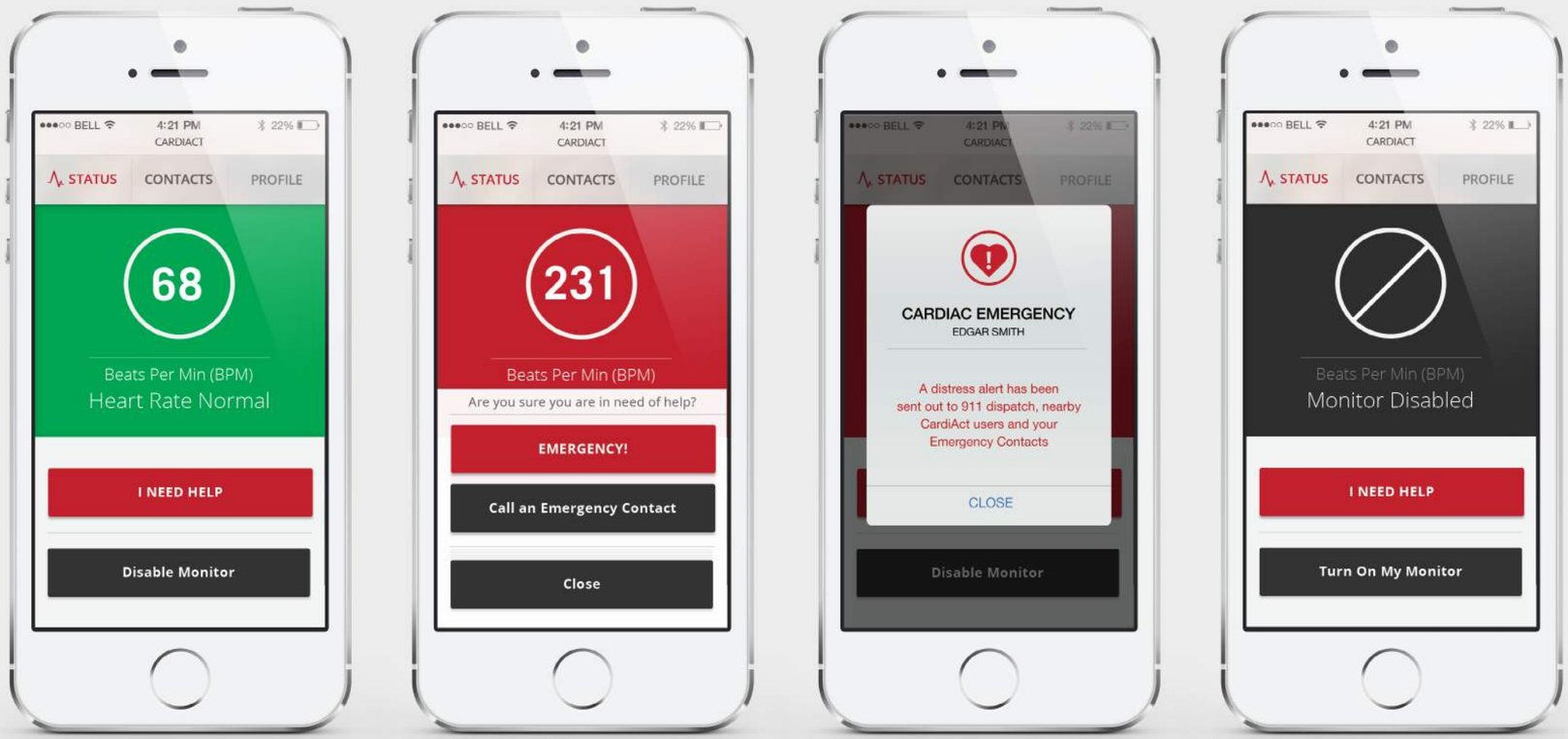

# STATUS + SECONDARY

In emergency mode, the Status tab provides vital information including the time elapsed since the alert was triggered, a BPM reading of the victim (if available), the victim's profile, and any confirmed responders, organized by proximity. The secondary screens show more detailed information about the victims and responders, popovers available in the Map tab, detailed directions and a popover that allows a user to contact a victim's emergency contact or other responders by phone.



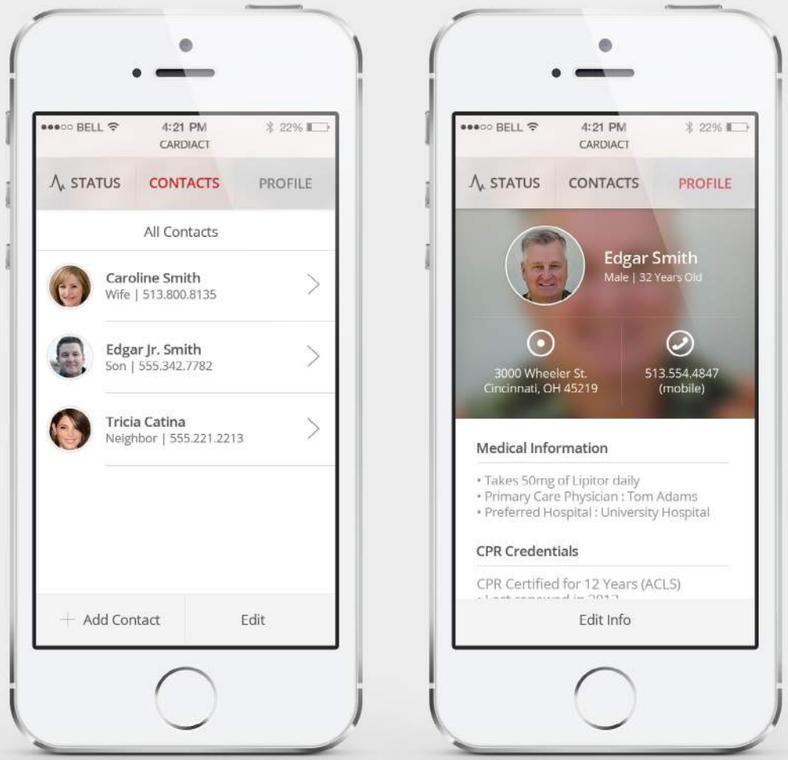

# STATIC MODE

CardiAct displays emergency mode once a user requests help, or a dangerous heart rate is detected by their monitor. The CPR Responder(s) will be sent an alert allowing them to view the map, and providing the victims location along with other vital information needed to help save the victims life.




# STATUS FLOW

In static mode, the Status tab displays the user's BPM (if available), as well as options to request help or disable features like response availability, or heart monitoring.




# CONTACTS + PROFILE

The Contacts tab allows a user to designate up to 3 people who will receive an alert when they request medical assistance for cardiac arrest, no matter their proximity to the victim. The Profile tab contains important information about the user including an image, name, phone number, address, CPR certification details, and relevant medical information.